

Notice of Allowability

Application No.

09/993,832

Examiner

Lynette T. Umez-Eronini

Applicant(s)

KWEAN ET AL.

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 11/22/2004.
2. ☒ The allowed claim(s) is/are 10-13, 15, 16 and 18-32.
3. ☒ The drawings filed on 06 November 2004 are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

George

REASON FOR ALLOWANCE

Applicants' Remarks in Advisory filed November 22, 2004, provide support to overcome the previous 112(1) rejection (pages 2-3).

1. Claims 10-13, 15, 16, and 18-32 are allowed.
2. The following is an examiner's statement of reasons for allowance:

As to claims 10-13 and 29, Applicants' Remarks in Advisory, filed November 22, 2004, include persuasive arguments (pages 4-9) to show the prior art of record, taken alone or in combination fails to suggest, teach, or render obvious –

A method of etching a silicon layer comprising the step of: applying a plasma of an etching gas composition onto said silicon oxide, wherein the etching gas composition consists essentially of: (i) a carbon fluoride gas of the general chemical formula C_xF_y , in which y/x is a ratio having a value less than 2 and which chemical formula includes at least a double or a triple carbon-carbon bond; (ii) a fluorohydrocarbon gas of the general chemical formula $C_kH_lF_m$, in which k , l and m are positive integers and wherein the volumetric flow rate of the fluorohydrocarbon gas to that of the carbon fluoride gas is a ratio having a value in a range of about 0.1 to 3.0; and (iii) oxygen, wherein the volumetric flow rate of oxygen to that of the carbon fluoride gas is a ratio having a value of about 1 to 1, in combination with the other limitations of the claims;

Art Unit: 1765

As to claims 23-28, the prior art of record taken alone or in combination fails to suggest, teach, or render obvious -

A method of manufacturing a contact hole of a semiconductor device comprising the step of: etching a silicon oxide layer by a plasma of an etching gas composition, wherein the etching gas composition comprises about 5-20 parts by volume of C_5F_8 , 200-5000 parts by volume Ar, 20-150 parts by volume CO, 2-20 parts by volume O_2 , and 2-15 parts by volume CH_2F_2 gas into said reaction, in combination with the other limitations of the claims;

As to claims 15, 16, 18-22, and 30, Applicants' Remarks in Advisory, filed November 22, 2004, include persuasive arguments (pages 4-9) to show the prior art of record, taken alone or in combination fails to suggest, teach, or render obvious -

A method of manufacturing contact holes of a semiconductor device comprising the step of: etching a silicon oxide layer by plasma of an etching gas composition, wherein the etching gas composition consists essentially of: (i) a carbon fluoride gas of the general chemical formula C_xF_y , in which y/x is a ratio having a value less than 2 and which chemical formula includes at least a double or a triple carbon-carbon bond; (ii) a fluorohydrocarbon gas of the general chemical formula $C_kH_lF_m$, in which k , l and m are positive integers and wherein the volumetric flow rate of the fluorohydrocarbon gas to that of the carbon fluoride gas is a ratio having a value in a range of about 0.1 to 3.0; and (iii) oxygen, wherein the volumetric flow rate of oxygen to that of the carbon fluoride gas is a ratio having a value of about 1 to 1, in combination with the other limitations of the said claims;

Art Unit: 1765

As to claim 31, the prior art of record, taken alone or in combination fails to suggest, teach, or render obvious –

A method of etching a silicon oxide layer comprising the step of: applying a plasma of an etching gas composition, wherein the etching gas composition consists essentially of: (i) a carbon fluoride gas selected from the group consisting of C_4F_6 , C_3F_4 , C_2F_2 , and mixtures thereof; and (ii) a fluorohydrocarbon gas of the general chemical formula $C_kH_lF_m$, in which k, l and m are positive integers and wherein the volumetric flow rate of the fluorohydrocarbon gas to that of the carbon fluoride gas is a ratio having a value in a range of about 0.1 to 3.0, in combination with the rest of the limitations of said claims; and

As to claim 32, the prior art of record, taken alone or in combination fails to suggest, teach, or render obvious –

A method of manufacturing contact holes of a semiconductor device comprising the step of: etching a silicon oxide layer by plasma of an etching gas composition, wherein the etching gas composition consists essentially of: (i) a carbon fluoride gas selected from the group consisting of C_4F_6 , C_3F_4 , C_2F_2 , and mixtures thereof; and (ii) a fluorohydrocarbon gas of the general chemical formula $C_kH_lF_m$, in which k, l and m are positive integers and wherein the volumetric flow rate of the fluorohydrocarbon gas to that of the carbon fluoride gas is a ratio having a value in a range of about 0.1 to 3.0, in combination with the rest of the limitations of said claims.

Art Unit: 1765

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 571-272-1470. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Art Unit 1765

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December 11, 2004

Primary Examiner
Duy-Vu Dao
Heung